

Chapter 7

Determination of plasma Reynolds number, hydrodynamic and magnetic

7.1 Definitions

Hydrodynamic Reynolds's number

$$Re = LV/\nu$$

= Inertial force/Viscous force

Where ν = fluid viscosity

Magnetic Reynolds's number

$$R_m = \mu_0 LV/\eta$$

$$= \sigma LV$$

$$= \text{Flow velocity/magnetic diffusion velocity}$$

where η = resistivity, (σ = conductivity), L = length scale of system, V = flow velocity of fluid (plasma in our case).

R_m is a dimensionless parameter that determines the degree to which the magnetic field is effectively frozen-into the fluid.

Different MHD systems with the same R_m will have geometrically similar flow behavior that can be scaled to match each other under a suitable transformation of length and time units.

7.2 Range of accessible values